

REMARKS

This Amendment is in response to the Office Action mailed June 19, 2002. Claims 1-33 are pending in the application and have been rejected. Applicants have cancelled claims 2, 4-6, 10, 13, 15, 19 and 22-33 and have amended pending claims 1, 3, 7-9, 11-12, 14, 16-18 and 20-21 and respond to the Office Action as follows.

Response to claim rejections - 35 U.S.C. § 103

Claims 1-33 were rejected under 35 U.S.C. § 103 as being unpatentable over Applicants' admitted prior art, FIGS. 1-16, in view of Suzuki, JP10-069747. By this Amendment, claims 2, 4-6, 10, 13, 15, 19 and 22-33 have been cancelled and claims 1, 3, 7-9, 11-12, 14, 16-18 and 20-21 have been amended and as amended, are allowable over the combination of Applicants' admitted prior art and Suzuki.

Claims 1 and 3 recite *inter alia* means for controlling roll parameters of a head assembly. (Means-plus-function language in a claim must be interpreted to include the structure disclosed in Applicants' specification and equivalents.) As properly interpreted, the combination of Applicants' admitted prior art and Suzuki does not teach nor suggest (controlling roll parameters) of a head as now claimed. In particular, as described in Applicants' specification, variations in the roll attitude of the head assembly can have effects on the fly height of the head assembly. Prior techniques do not provide a dynamic means as described in Applicants' specification for compensating for roll attitude.

As described in Applicants' specification, bending elements are energized to alter the roll attitude of the attached head assembly for dynamic control. As illustrated in FIG. 19, current is independently applied to the bending element on an outermost gimbal beam as indicated with a combination of dashed

and solid line and to the bending element on an inner gimbal beam as shown with a heavy solid line to provide roll attitude control. (Applicants' specification, Page 20, lines 1-10). The present invention allows for positive and negative roll moments to be exerted on the head assembly dependent upon the radial position of the head. (Applicants' specification, Page 20, lines 30 - Page 21, line 2). Accordingly, based upon the foregoing, reconsideration and allowance of claims 1 and 3 are respectfully requested.

Claims 7 and dependent claims 8-9, 11, 12 and 14, as amended, recite *inter alia* a gimbal portion having spaced gimbal beams and a plurality of bending elements including at least one bending element on one of said gimbal beams and at least one bending element on another of said gimbal beams which is not taught nor suggested by the combination of Applicants' admitted prior art and Suzuki. As previously discussed, the recited structure provides for (dynamic control of roll attitude of the head which is not taught nor suggested by the combination of Applicants' admitted prior art and Suzuki).

Claim 16 and dependent claims 17, 18, 20 and 21 as amended, recite *inter alia* a plurality of bending elements including at least one bending element on a first side of a roll axis and at least one bending element on a second side of a roll axis which are actuatable to adjust a roll attitude of the head assembly and is not taught nor suggested by the combination of Applicants' admitted prior art and Suzuki. As previously discussed, (the recited plurality of bending elements provides a system for dynamically controlling the roll attitude of the head assembly which is not taught nor suggested by the recited combination of references.)

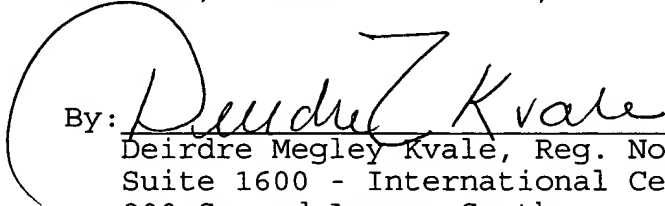
New claims 34-38 have been added for consideration and allowance. Favorable consideration of new claims 34-38 is respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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MARKED-UP VERSION OF REPLACEMENT PARAGRAPHS

Page 1, lines 15-18:

This application relates generally to the field of rigid magnetic disc drive data storage devices, and more particularly, ~~by~~but not by way of limitation, to a head suspension for mounting and supporting a head assembly in a disc drive, and for providing dynamic control of the flying attitude of the head assembly.

Page 3, lines 24-29:

It is common in the industry to move the head assemblies to designated park location when the disc drive experiences a loss of power. In a first class of disc drive, this park location is associated with ramp structures adjacent the outer diameters of the discs, and the head assemblies are "parked" on the ramp structures, out of contact with the discs. Such disc drives are capable of withstanding large amounts of applied mechanical shock, and are frequently used, therefore, with laptop computer systems.

Page 4, lines 12-16:

Once again, as the data recording zones of the discs became smoother and smoother, it was necessary to reduce the "roughness" of the landing zones, in order to enable the head assemblies to fly into the landing zones, and reducing the roughness of the landing zone has ~~lead~~led back to the problems of stiction which the textured surfaces of the landing zones were intended to alleviate.

MARKED-UP VERSION OF REPLACEMENT CLAIMS

1. (Amended) A head suspension for supporting a head assembly in cooperative engagement with a rotating disc in a disc drive, the head suspension mounted to an actuator for controllably moving the head assembly radially over thea surface of the disc, the head suspension comprising:

a gimbal portion for mounting the head assembly and providing compliance in roll and pitch axes of the head assembly;

a load beam portion for exerting a load force on the head assembly ~~to encourage the head assembly toward the disc,~~

~~the gimbal portion and load beam portion being fixed in relation to each other and configured to provide static control of a flying attitude of the head assembly~~
relative to a load point and the gimbal portion supporting the head assembly to roll about a roll axis;
and

means for ~~controllably altering the flying attitude of the head assembly in accordance with~~ controlling roll attitude of the head assembly based upon a radial position of the head assembly in relation to the disc.

Claim 2 has been cancelled.

3. (Amended) A disc drive comprising:

a rotating disc mounted for rotation in the disc drive;

a head assembly for recording digital information to and retrieving information from the disc;

a head suspension ~~for mounting the head assembly and for providing static control of a flying attitude of the head assembly above the rotating disc~~ including a load

portion adapted to supply a load force to the head assembly at a load point and a gimbal portion to allow the head assembly to pitch and roll relative to the load point;

~~an actuator to which coupled to the head suspension is mounted for moving to move the head assembly radially over~~relative to the disc; and

~~means for dynamically controlling the flying attitude of the head assembly above the disc in accordance with roll attitude of the head assembly~~radial position of the head assembly in relation to the disc.

Claims 4-6 have been cancelled.

7. (Amended) A head suspension for mounting a head assembly in cooperative engagement with a rotating disc in a disc drive, the head suspension mounted to an actuator for controllably moving the head assembly radially over ~~the~~a surface of the disc, the head suspension comprising:

~~a gimbal portion for mounting the head assembly and providing compliance in roll and pitch axes of the head assembly;~~

~~a load beam portion for exerting a load force on the head assembly to encourage the head assembly toward the disc~~relative to a load point;

a gimbal portion having the head assembly coupled thereto to allow the head assembly to pitch and roll relative to the load point and the gimbal portion including opposed spaced gimbal beams on opposed sides of the load point;

~~the gimbal portion and load beam portion being fixed in relation to each other and configured to provide static control of a flying attitude of the head assembly;~~

~~the gimbal portion further including~~a plurality of bending

~~elements for dynamically controlling the flying attitude of the head assembly in accordance with radial position of the head assembly with relation to the disc~~
including at least one bending element on one of said gimbal beams and at least one bending element on another of said gimbal beams.

8. (Amended) A head suspension as claimed in claim 7, wherein:
~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams; and the plurality of bending elements are mounted on the gimbal beams~~
each includes opposed leads coupled thereto to selectively energize the plurality of bending elements.

9. (Amended) A head suspension as claimed in claim 7, wherein:
~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams and a connecting cross member between distal ends of the gimbal beams; and~~
~~the bending elements are mounted on the connecting cross member~~
the at least one bending element on the one of said gimbal beams and the at least one bending element on the other of said gimbal beams are formed of a thermally expandable material forming a bi-metal structure having different coefficients of thermal expansion.

Claim 10 has been cancelled.

11. (Amended) A head suspension as claimed in claim ~~10~~7,
wherein:

~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams; and~~

~~the plurality of bending elements are mounted on the gimbal beams formed of a piezoelectric material.~~

12. (Amended) A head suspension as claimed in claim 107, wherein:

~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams and a connecting cross member between distal ends of the gimbal beams; and~~

~~the bending elements are mounted on the connecting cross member~~
the at least one bending element on the one of said gimbal beams and the at least one bending element on the other of said gimbal beams have an elongated length extending along an elongated length portion of the gimbal beams.

Claim 13 has been cancelled.

14. (Amended) A head suspension as claimed in claim 138, wherein the plurality of bending elements include opposed leading and trailing ends and the opposed leads are coupled proximate to opposed leading and trailing ends of the plurality of bending elements;

~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams; and~~
~~the bending elements are mounted on the gimbal beams.~~

Claim 15 has been cancelled.

16. (Amended) A head suspension for mounting a head assembly in cooperative engagement with a rotating disc in a disc drive, the head suspension mounted to an actuator for controllably moving the head assembly having a leading edge, a trailing edge and

opposed sides radially over thea surface of the disc, the head suspension comprising:

~~a gimbal portion for mounting the head assembly and providing compliance in roll and pitch axes of the head assembly;~~

~~a load beam portion for exerting a load force on the head assembly to encourage the head assembly toward the disc;~~

~~the gimbal portion and load beam portion being fixed in relation to each other and configured to provide static control of a flying attitude of the head assembly relative to a load point;~~

a gimbal portion having the head assembly coupled thereto to allow the leading edge of the head assembly to pitch about a pitch axis and the opposed sides of the head assembly to roll about a roll axis relative to the load point;

the gimbal portion further including bi-metal a plurality of bending elements for dynamically controlling the flying attitude of the head assembly in accordance with radial position of the head assembly with relation to the disc including at least one bending element on a first side of the roll axis and at least one bending element on a second opposed side of the roll axis actuatable to adjust a roll attitude of the head assembly relative to the roll axis.

17. (Amended) A head suspension as claim in claim 16, wherein:

~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams; and the plurality of bending elements are mounted on the gimbal beams~~
formed of a thermally expandable material forming a bi-metal structure having different coefficients of

thermal expansion or a piezoelectric material.

18. (Amended) A head suspension as claimed in claim 16, wherein:
the gimbal portion further comprises a pair of ~~laterally disposed,~~ longitudinally extending gimbal beams and a connecting cross member between distal ends of the pair of gimbal beams; and
the plurality of bending elements are mounted on the connecting cross member.

Claim 19 has been cancelled.

20. (Amended) A head suspension as claimed in claim ~~19~~16, wherein:
the gimbal portion further comprises a pair of ~~laterally disposed,~~ longitudinally extending gimbal beams; and
the plurality of bending elements are mounted on the pair of gimbal beams.

21. (Amended) A head suspension as claimed in claim ~~19~~16, wherein:
~~the gimbal portion further comprises a pair of laterally disposed, longitudinally extending gimbal beams and a connecting cross member between distal ends of the gimbal beams; and~~
the plurality of bending elements ~~are mounted on the connecting cross member~~ each include opposed leads coupled thereto to selectively energize the plurality of bending elements.

Claims 22-23 have been cancelled.